WHAT IS CLAIMED IS:

1. A method for transmission rate adaptation used in a wireless network, a current transmission rate being selected from a set of predetermined transmission rates, each of the predetermined transmission rates, R, being associated with a PER (packet error rate) range, which includes a predetermined threshold pair of a high PER (packet error rate) threshold, denoted as $Q_H(R)$, and a low PER threshold, denoted as $Q_L(R)$, the method comprising:

determining a first number N1 and a second number N2 according to the $Q_H(r_n)$ and the $Q_L(r_n)$, respectively, wherein N1 and N2 are positive integers, r_n denotes the current transmission rate, the subscript n denotes a adaptation iteration index ;

transmitting a first plurality of packets, wherein the number of the first plurality of packets is N1;

receiving a first plurality of acknowledge packets, each one in the first plurality of acknowledge packets responding to one of the first plurality of

packets, wherein the number of the first plurality of acknowledge packets is A1, A1 is a positive integer and A1<=N1, wherein a first estimated PER, denoted as $P1(r_n)$, corresponding to the current transmission rate is $P1(r_n)$ =(N1-A1)/N1;

reducing the transmission rate if the $P1(r_n)$ being larger than the $Q_H(r_n)$;

transmitting a second plurality of packets, wherein the number of the second plurality of packets is (N2-N1);

receiving a second plurality of acknowledge packets, each one in the second plurality of acknowledge packets responding to one in the second plurality of packets, wherein the number of the second plurality of acknowledge packets is A2 and A2<=(N2-N1), wherein a second estimated PER, $P2(r_n)$, corresponding to the current transmission is $P2(r_n)$=(N2-A1-A2)/N2;

reducing the transmission rate if the $P2(r_n)$, being larger than the $Q_H(r_n)$;

increasing the transmission rate if the $P2(r_n)$ being smaller than the $Q_L(r_n)$; and

keeping the transmission rate if the $P2(r_n)$ falls between the $Q_H(r_n)$ and the $Q_L(r_n)$;

wherein the numbers N1 and N2 are large enough such that the $P1(r_n)$ and the $P2(r_n)$ are substantially reliable.

2. The method according to claim 1, further comprises:

checking if M consecutive packets of the first or second plurality of packets being failed to be acknowledged, if yes, decreasing the transmission rate, wherein M is an integer.

3. The method according to claim 1, wherein the transmission rate remains unchanged if the transmission rate at the step of reducing the transmission rate is the lowest one, or the transmission rate at the step of increasing transmission rate is the highest one.

4. A method for transmission rate adaptation used in a wireless

network, a current transmission rate is selected from a set of predetermined transmission rates, each of the predetermined transmission rates, R, being associated with a PER (packet error rate) range, which includes a predetermined threshold pair of a high PER (packet error rate) threshold, denoted as $Q_H(R)$, and a low PER threshold, denoted as $Q_L(R)$, the method comprising:

(1) calculating a first estimated PER, denoted as $P1(r_n)$, wherein r_n denotes the current transmission rate, and the subscript n denotes the adaptation iteration index ;

(2) checking whether the $P1(r_n)$ being larger than the $Q_H(r_n)$, if yes, processing step (3), else processing step (4);

(3) reducing the transmission rate and ending the method;

(4) calculating a second estimated PER, denoted as $P2(r_n)$;

(5) checking whether the $P2(r_n)$ being smaller than the $Q_L(r_n)$, if yes, processing step (6), else processing step (7);

(6) increasing the transmission rate and ending the method; and

(7) checking whether the $P2(r_n)$ being larger than the $Q_H(r_n)$, if yes, processing step (8), else ending the method; and

(8) reducing the transmission rate.

5. The method according to claim 4, wherein step (1) comprises:

determining a first number according to the $Q_H(r_n)$;

transmitting a first plurality of packets, wherein the number of the first plurality of packets equals to the first number;

receiving a first plurality of acknowledge packets, wherein each one in the first plurality of acknowledge packets responding to one of the first plurality of packets; and

calculating the first estimated PER $P1(r_n)$ according to the number of the first acknowledge packets and the number of the first plurality of packets;

wherein the first number is large enough such that the $P1(r_n)$ is substantially reliable.

6. The method according to claim 5, wherein the transmission rate is reduced if there are M consecutive ones of the first plurality of packets failed to be acknowledged, wherein M is an integer.

7. The method according to claim 5, wherein step (4) comprises:

determining a second number according to the $Q_L(r_n)$;

transmitting a second plurality of packets, wherein the sum of the number of the second plurality of packets and the number of the first plurality of packets equals to the second number;

receiving a second plurality of acknowledge packets, wherein each one in the second plurality of acknowledge packets responding to one of the second plurality of packets; and

calculating the second estimated PER $P2(r_n)$, according to the number of the second plurality of acknowledge packets, the number of the first

plurality of acknowledge packets and the second number;

wherein the second number is large enough such that the $P2(r_n)$ is substantially reliable.

8. The method according to claim 7, wherein the transmission rate is reduced if there are M consecutive ones of the second plurality of packets being failed to be acknowledged, wherein M is an integer.

9. The method according to claim 4, wherein step (4) comprises:

transmitting a second plurality of packets, wherein the number of the second plurality of packets is determined according to the $Q_L(r_n)$;

receiving a second plurality of acknowledge packets, wherein each one in the second plurality of acknowledge packets responding to one of the second plurality of packets; and

calculating the second estimated PER $P2(r_n)$ according to the number of the second plurality of acknowledge packets and the number of the second plurality of packets;

wherein the number of the second plurality of packets is large enough such that the second estimated PER is substantially reliable.

10. The method according to claim 9, wherein the transmission rate is reduced if there are M consecutive ones of the second plurality of packets being failed to be acknowledged, wherein M is an integer.

11. The method according to claim 4, wherein the transmission rate remains unchanged if the transmission rate at the step of reducing the transmission rate is the lowest one, or the transmission rate at the step of increasing transmission rate is the highest one.

12. The method according to claim 4, further comprising a step of adapting PER range, which comprises:

recording an adapting direction parameter D_n, being one of a first direction, a second direction, and a third value, and the adapting direction parameter representing that the transmission rate is adapted to a higher one, a lower one, and the same one respectively;

computing an estimated throughput $?(r_n)$ associated with the

transmission rate r_n;

determining whether the current estimated throughput ?(r_n) being smaller than the previous estimated throughput ?(r_{n-1}) and a previous adapting direction parameter D_{n-1} is of the first direction, if yes, performing a first range adaptation for adapting the low PER threshold $Q_L(r_n)$ associated with the current transmission rate r_n and the high PER threshold $Q_H(r_{n-1})$ associated with the previous transmission rate r_{n-1}, and increasing the transmission rate; and

determining whether the current estimated throughput ?(r_n) being smaller than the previous estimated throughput ?(r_{n-1}) and the previous adapting direction parameter D_{n-1} is of the second direction, if yes, performing a second range adaptation for adapting the high PER threshold $Q_H(r_n)$ associated with the current transmission rate r_n and the low PER threshold $Q_L(r_{n-1})$ associated with the previous transmission rate r_{n-1}, and decreasing the transmission rate.

13. The method according to claim 12, wherein the first range adaptation comprises:

increasing the $Q_L(r_n)$ and the $Q_H(r_{n-1})$ by a first predetermined value and a second predetermined value, respectively.

14. The method according to claim 12, wherein the second range adaptation comprises:

decreasing the $Q_H(r_n)$ and the $Q_L(r_{n-1})$ by a third predetermined value and a fourth predetermined value, respectively.

15. The method according to claim 12, wherein the calculation of the estimated throughput $?(r_n)$ associated with the transmission rate r_n at adaptation iteration n comprises:

computing a final estimated PER $P(r_n)$ associated with the transmission rate r_n, wherein the $P(r_n)$ equals to the $P2(r_n)$ if the $P2(r_n)$ is valid, otherwise, the $P(r_n)$ equals to the $P1(r_n)$;

computing the estimated throughput $?(r_n)$ based on the $P(r_n)$ and a predetermined maximal throughput $?_0(r_n)$ associated to the transmission rate r_n at adaptation iteration n.

16. The method according to claim 15, wherein $?(r_n)= ?_0(r_n)*(1-P(r_n))$.

17. The method according claim 12 further comprising a step for avoiding a ping-pong event, which comprises:

calculating a ping-pong parameter based on the adapting direction parameters D_n and D_{n-1}, wherein the ping-pong parameter is increased when D_n and D_{n-1} represents the opposite direction to each other, otherwise, the ping-pong parameter is reset; and

determining whether the ping-pong parameter being larger than a ping-pong threshold, if yes, processing the step of adapting PER range.

18. The method according to claim 17, wherein the step for avoiding ping-pong event is performed before the step of increasing or decreasing the transmission rate.

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